

Independent Claims 1 and 3 have been amended just to rearrange recitation as requested at the top of page 3 of the Office Action and correct recitation of component b2 to alkylene oxide adduct. Accordingly, there is clearly adequate support for the amendment to Claims 1 and 3 herein (a marked-up copy is enclosed). Claims 1-20 and 27 have been rejected under 35 U.S.C. § 103 as obvious over Takashi et al. (U.S. Pat. No. 4,318,950) in view of European Pat. No. 0 613 919 (Ueda et al.) and Ohba et al. (U.S. Pat. No. 5,233,924) in paragraph 1 of the Office Action. However, it is respectfully emphasized that the present invention as recited in all claims pending herein is patentable over the applied art for the following reasons (reference will be made to the enclosed Second Supplemental Declaration setting forth additional test comparisons).

In order to reject an invention under 35 U.S.C. § 103(a) as being unpatentable over a combination of prior art, a suggestion or motivation for combining the prior art is needed. *In re Sang Su Lee*, (Fed. Cir. 2002) 277 F.3d 1338.

EP 0 613 919 A1 (Ueda et al) describes on page 2, lines 42 and 43 "to provide an antistatic resin composition with superior permanently antistatic property, mechanical strength and moldability [emphasis added]". Further Ueda et al describe on page 11, lines 14-15 "the permanently antistatic property and mechanical strength of the molded articles [emphasis added]." Accordingly, Ueda et al. describe a resin composition used for the production of molded articles, but neither describe nor suggest the use of resin compositions for production of synthetic paper by forming the resin composition into a sheet by biaxial stretching and availability of the resin composition for the improvement in

printability on synthetic paper. There is no suggestion or motivation for using the resin composition used for the production of the molded articles as described in Ueda et al, for the synthetic paper of Takashi et al or Ohba et al.

The compounds described as an antistatic agent in Takashi et al are only polyoxyalkyl amine, aliphatic glycerine ester, alkyl phosphate and alkyl betaine (which are surface active agents having low molecular weight and no amido group) at columns 7 and 8 of Takashi et al. Further, the amount of antistatic agent used is very small, as is clear from the description "the antistatic agents are about 0.1% to about 1.5% by weight" at column 19, lines 21-22 of Takashi et al. Accordingly Takashi et al. neither suggest nor motivate use of high molecular weight polyetheresteramide as described in Ueda et al. in place of low molecular weight surface active agent in an amount larger than the amount described in Takashi et al. Takashi et al describe, as the dispersing agent, only polyoxy ethylene alkyl ether, alkyl phospho esterate and polyoxy alkyl amine at columns 7-10 and are silent about any suggestion or motivation for using component D (modified polypropylene) of the present invention.

In order to clarify the differences between the present invention and Takashi et al., the following experimentation has been conducted and presented in the accompanying Second Supplemental Declaration under 37 C.F.R. 1.132:

(1) an experiment wherein the same procedure as in Example 12 of Takashi et al. (which is closest to the present invention among the examples of Takashi et al.) in which a polyamide is added to a resin component, was performed;

(2) an experiment wherein the same procedure as in Example 12 of Takashi et al. was performed except for changing the low molecular weight antistatic agent to 0.7 parts by weight of polyetheresteramide;

(3) an experiment wherein the same procedure as in Example 12 of Takashi et al. was performed except for changing the low molecular weight antistatic agent to 20 parts by weight (16.7% by weight based on the resin component, the same amount as in the present invention) of polyetheresteramide; and

(4) an experiment wherein the same procedure as in Example 1 of the present application was performed. The above described four kinds of synthetic papers have been produced and evaluated for surface resistivities both before and after washing with water and offset printability.

As is clear from the results presented in Table 2 of the enclosed Declaration, the synthetic paper of (1) has high surface resistivity and poor offset printability, the synthetic paper of (2) also has high surface resistivity and poor offset printability, and the synthetic paper of (3) just has a small effect of improving antistatic property because of poor dispersibility of polyetheresteramide and has poor offset printability. Experiment (4), Example 1 of the present application, is definitely superior in both surface resistivity and offset printability to Experiments 1 to 3.

It is clear from these results that even if the low molecular weight antistatic agent as described in Takashi et al is replaced with high molecular weight antistatic agent,

polyetheresteramide, then antistatic property and suitability for paper feeding/discharge (offset printability) still remain unimproved.


Experimentation set forth in the enclosed Second Supplemental Declaration was also conducted wherein a film was attempted to be produced using a composition of Ueda et al. under the conditions of Takashi et al. (Experiment 5). The composition of Example 43 of Ueda et al., was selected as closest to the present invention.

As a result of the experimentation, biaxially stretched film could not be obtained because the sheet broke at a portion clipped by a chuck of the tenter stretching machine when stretched in the transverse direction. This is believed to be ascribable to the following reason; because polypropylene (PP) of grade suitable for injection molding has MFR of 9 g/min., high flowing property and low melting tension, when the polypropylene was stretched in the transverse direction with a chuck of the tenter stretching machine heated at a temperature of 160°C (a temperature around the melting point of PP), the sheet was broken and could not be stretched. The fusion bond of the sheet on the chuck was observed after the sheet was broken. Accordingly, it is clear that biaxially stretched film is difficult to produce from the composition of Ueda et al under the conditions of Takashi et al.

Accordingly, in view of the forgoing amendment, accompanying remarks and enclosed Second Supplemental Declaration, it is respectfully submitted that all claims presented herein are in condition for allowance. Should the Examiner have any questions, then it is respectfully requested that the undersigned attorney be contacted at the earliest convenience to discuss the present application. A petition for an automatic three month extension of time for response under 37 C.F.R. §1.136(a) is enclosed in triplicate together with the requisite petition fee.

Early, favorable action is earnestly solicited.

Respectfully submitted,
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RECEIVED**Second Supplemental Declaration under 37 C.F.R. § 1.132**I, **Masaaki Yamanaka**, do hereby declare:

1. I am the Declarant who executed the previous declarations on October 6, 1999 and March 22, 2001 in the above-identified application;
2. The following experimentation (3 experiments) was carried out under my supervision and control:

A. EXPERIMENT 1

The same procedure as in Example 12 of the invention of Takashi et al. (U.S. Pat. No. 4,318,950) was performed. The same composition as in Tables I(b) and II(b) and the same molding conditions as in Table III of Takashi et al. were used but conditions not described in Takashi et al., such as extrusion temperature, cooling temperature, etc. were replaced by those described in the present application.

A resin composition (A) containing 80 parts by weight of polypropylene (Novatec PP, MA-8 manufactured by Japan Polychem Corp, melting point 164°C), 20 parts by weight of polyamide (extrusion grade Nylon 6, UBE Nylon 1022FDX23

manufactured by Ube Industries, Ltd.), 0.5 part by weight of diatomaceous earth and 0.1 part by weight of dispersing agent (NYMEEN S-210, manufactured by NOF Corp.) was melt-kneaded with an extruder set at 270°C, subsequently extruded into a sheet, and then cooled to a temperature of about 50°C.

After being heated to about 140°C, this sheet was stretched in the machine direction 5 times using a peripheral velocity of rolls to obtain a machine-directionally stretched film.

A resin composition (B) containing 80 parts by weight of polypropylene (Novatec PP, MA-3 manufactured by Japan Polychem Corp, melting point 165°C), 20 parts by weight of polyamide (UBE Nylon 1022FDX 23 manufactured by Ube Industries, Ltd.), 80 parts by weight of clay (particle size 1 micron, manufactured by Englehart Minerals & Chemicals Co.), 0.5 parts by weight of dispersing agent (NYMEEN S-210, manufactured by NOF Corp.) and 0.7 parts by weight of low molecular weight antistatic agent (PHOSPHANOL RL-20, (formerly Phosphanol SM-1), manufactured by Toho Chemical Industry Co. Ltd. and used in Example 1 of Takashi et al. (the low molecular weight antistatic agent of RESISTAT PE132 of Example 12 of Takashi et al. no longer being available) was melt-kneaded with two extruders set at 250°C separately, extruded from the die into a film (A) on both surfaces of the machine-directionally stretched film and then laminated (B/A/B) to form a laminate (paper-like layer/base layer/paper-like layer).

This three layer film (B/A/B) was introduced into a tenter oven, heated to 165°C, stretched in the transverse direction 7 times with a tenter stretching machine at a temperature of 160°C and then heat-set at a temperature of 140°C. Subsequently, the stretched film was treated with 70 W/m²·min. corona discharge on the side of the paper-like layer(layer B), cooled to a temperature of 55°C and trimmed. The thickness of the three-layer stretched film was 140 microns and the thickness of the individual layers (B/A/B) were 50 µm/40µm/50µm. The thus obtained synthetic film is a composite film containing a biaxially stretched base layer (A) and two uniaxially stretched paper-like layers (B) (surface layers).

B. EXPERIMENT 2

The same procedure as in Experiment 1 was performed except for changing the low molecular weight antistatic agent to a high-molecular weight antistatic agent of the present application, polyetheresteramide (product Example 1(B1) in the present application).

C. EXPERIMENT 3

The same procedure as in Experiment 2 was performed except for using the high-molecular weight antistatic agent in an amount of 20 parts by weight (16.7% by weight based on the resin components).

D. EXPERIMENT 4

The same procedure as in Example 1 on pages 29-31 of the present application.

The composition of these three Experiments 1-4 supra are set forth in accompanying Table I.

C. Evaluation of Experiments 1-4

(1) Surface resistivities of the synthetic papers before and after washing with water and (2) ink adhesion and suitability for paper feeding/discharge as the offset printability, were evaluated according to the procedures set forth in the present application. The results are shown in Table 2 below.

(1) Surface Resistivity

The surface resistivity of the synthetic paper containing 0.7 part by weight of low-molecular weight antistatic agent of Experiment 1 was found to be $2 \times 10^{13} \Omega$ before washing with water, which was somewhat improved, but $1 \times 10^{16} \Omega$ after washing with water, which deteriorated.

The surface resistivity of the synthetic paper containing 0.7 part by weight of polyetheresteramide of Experiment 2 was $2 \times 10^{14} \Omega$ before washing with water, which was somewhat improved, and $2 \times 10^{14} \Omega$ after washing with water, unchanged.

The surface resistivity of the synthetic paper containing 20 parts by weight (16.7% by weight based on the resin composition) of polyetheresteramide of

Experiment 3 was $1 \times 10^{13} \Omega$ before washing with water, which was somewhat improved and 1×10^{13} after washing with water, unchanged. Because a large amount of polyetheresteramide was added, the polyetheresteramide was insufficiently dispersed, so the surface resistivities of 10^{10} to $10^{11} \Omega$ as described in the examples of the present application could not be obtained.

The surface resistivity of Experiment 4 was 4×10^9 before washing and 3×10^9 after washing, a clear improvement after washing.

(2) Offset Printability

The symbols in Table 2 denote the following:

⊙: The ink remained unpeeled (ink adhesion) and there were no stops (feed/discharge suitability);

Δ: The ink was peeled almost completely to pose a problem in practical use although the peeling force required was not so weak (ink adhesion), and the number of printing stops was 2-5 (feed/discharge suitability); and

X: The number of printing stops was 6 or greater (feed/discharge suitability);

Referring to the results reported in Table 2, the ink adhesion on the synthetic paper of Experiment 1 was Δ and suitability for paper feeding/discharge X because of high surface resistivity;

the ink adhesion on the synthetic paper of Experiment 2 was Δ , and the suitability for paper feeding/discharge X because of high surface resistivity; and

the ink adhesion on the synthetic paper of Experiment 3 was Δ , and the suitability for paper feeding/discharge Δ because of surface resistivity which was still to high; and

both the ink adhesion on the synthetic paper and suitability for paper feeding/discharge of experiment 4 was \odot .

4. EXPERIMENT 5

1) A composition of Ueda et al. was selected as follows:

(A) Matrix resin: polypropylene (PP) described in the examples of Ueda et al. was used because PP is used as a matrix resin in Takashi et al. and the present invention;

(B) Polyetheresteramide (PEEA): an analogous PEEA to the PEEA used in the present invention was used in view of the examples of Ueda et al.;

(C) Polyamide resin: an analogous resin to polyamide resin used in the present invention was used in view of the examples of Ueda et al.; and

(D) Modified polypropylene (PP) resin: the analogous resin to modified PP resin used in the present invention was used in view of Ueda et al.

According to components (A) to (B) as described above, Example 43 as described on page 32 of Ueda et al. was selected as a composition of the invention of Ueda et al. More particularly, (A) the PP described on page 15, line 48 of Ueda et al, injection grade UBE Polypro J609 MFR 9g/min at 230°C and a load of 2.16 kg according to ASTM D-1238, was used; (B) the PEEA described on page 13, lines 25 to 34 of Ueda et al., which is an analogous PEEA to that of production Example 1 of the present application, was used; (C) the polyamide resin as described on page 15, line 46 of Ueda et al., Nylon 6 (UBE Nylon 1013B) was used; and (D) a modified PP described on page 22, lines 19 to 27 of Ueda et al, analogous to that of production Example 3 of the present application, was used. The compounding ratio was the same as in Example 43 which is described on page 32 of Ueda et al.

2) Compounding of the base layer

The compounding of the base layer was conducted according to Example 12 as described in Table I(b) at columns 9 to 10 in Takashi et al. A master batch was prepared from a composition obtained by adding the inorganic filler of example 12 of Takashi et al. in the amount of 0.5 part by weight diatomaceous earth, to the composition of example 43 of the invention of Ueda et al. in the same manner as described in Example 1, step (2) on pages 29-30 of the present application.

3) Compounding of the paper-like layer

The compounding of the paper-like layer was conducted as described in Example 12 at Table II(b), columns 11 to 12 of Takashi et al. A master batch was prepared from a composition obtained by adding the inorganic filler of Example 12 (80 parts by weight of clay) of Takashi et al. to the composition of Example 43 of the Invention of Ueda et al. in the same manner as described in Example 1, step (2) of the present application on pages 29-30.

4) Production of the base layer film

Because Takashi et al. do not describe the extrusion condition in detail, the same extrusion conditions as described in Example 1, step (1) at page 29 of the present application was used. The master batch for the base layer obtained in step (2) above was melt kneaded in an extruder set at 270°C, extruded into a sheet and cooled in a cooler to obtain an unstretched sheet. The extruded sheet was stretched 5 times using rolls under the production conditions of Example 12 of Takashi et al. as described in Table III, column 13 of Takashi et al., at 145°C.

5) Production of the paper-like layer film

The master batch for the paper-like layer obtained in step (3) above was melt kneaded at 250°C and laminated, using two extruders, to both sides of the

stretched sheet having a stretching ratio of 5 obtained in step (4) above at 250°C as described in Table III, column 13 of Takashi et al. The sheet having the three-layer structure was heated to 165°C as described in Table III, column 13 of Takashi et al., and attempted to be stretched in the transverse direction 8 times with a tenter stretching machine at a temperature of 160°C as described in Table III, column 13 of Takashi et al.

However, when the sheet was stretched in the transverse direction, the sheet was broken at a portion clipped by a chuck of the tenter stretching machine, so a biaxially stretched sheet could not be obtained. It is believed that this occurred because the polypropylene (PP) of grade suitable for injection molding as described in the examples of Ueda et al. has MFR of 9 g/min, high flowing property and low melting tension. When the PP was stretched in the transverse direction with a chuck of the tenter stretching machine heated at a temperature of 160°C, which is a temperature close to the melting point of PP, the sheet was broken and thus could not be stretched. A fusion bond of the sheet was then observed on the chuck after the sheet was broken.

Further, the stretching of the base layer in the machine direction with rolls, before the stretching with the tenter stretching machine could be performed, because the stretching temperature was as low as 150°C and the stretching ratio was as low as 5. In stretching in the machine direction there is no restriction of fixing in the transverse direction, i.e., the sheet is free to move in the transverse direction, so the sheet is

constricted in the transverse direction while stretched in the machine direction; this is different from stretching with the tenter stretching machine.

As documented above, it is clear that the biaxially stretched film is difficult to produce with the composition of Ueda et al. under the conditions of Takashi et al.

Table 1

Components: Base Layer									
	Resin	Parts	Filler	Parts	Anti-Static Agent	Parts	Dispersing Agent	Parts	
Ex. 1	PP ¹	80	Kiesel-	0.5			NYMEEN S-210	1.0	
	Polymide ³	20	Guhr						
Ex. 2	PP ¹	80	Kiesel-	0.5			NYMEEN S-210	1.0	
	Polymide ³	20	Guhr						
Ex. 3	PP ²	80	Kiesel-	0.5			NYMEEN S-210	1.0	
	Polymide ³	20	Guhr						
Ex. 4	Example 1 of the Present Application								
Components: Paper-like Layer									
	Resin	Parts	Filler	Parts	Anti-Static Agent	Parts	Dispersing Agent	Parts	
Ex. 1	PP ²	80	Clay	80	PHOSPANOL SM-1	0.7	NYMEEN S-210	0.5	
	Polymide ³	20							
Ex. 2	PP ²	80	Clay	80	PEEA	0.7	NYMEEN S-210	0.5	
	Polymide ³	20							
Ex. 3	PP ²	80	Clay	80	PEEA	20	NYMEEN S-210	0.5	
	Polymide ³	20							
Ex. 4	Example 1 of the Present Application								

PP¹: Polypropylene, "Novatec PP, MA-8" (trade name, melting point of 164°C) manufactured by Japan Polychem Corp.

PP²: Polypropylene, "Novatec PP, MA-3" (trade name, melting point of 165°C) manufactured by Japan Polychem Corp.

Polyamide³: Nylon 6, "UBE Nylon 1022FDX23" (trade name), manufactured by Ube Industries, Ltd.

PHOSPHANOL SM-1: "Phosphanol RL-210" (trade name has been changed), manufactured by Toho Chemical Industry, Co., Ltd.

NYMEEN S-210: Manufactured by NOF Corp.

PEEA: polyetheresteramide of Production Example 1 of the present application.

Table 2

	Molding/stretching/surface Treatment				Evaluation			
	Thickness (μm)	Stretching of Surface Layer		Surface treatment	Surface Resistivity (Ω)		Offset Printability	
	Front/core/back	Unl- or biaxial stretching	Stretching ratio		(a)	(b)	Ink adhesion	Suitability for paper feeding/dischage
Ex. 1	50/40/50	uniaxial	7	Corona	2x10 ¹³	1x10 ¹⁶	Δ	X
Ex. 2	50/40/50	uniaxial	7	Corona	2x10 ¹⁴	2x10 ¹⁴	Δ	X
Ex. 3	50/40/50	uniaxial	7	Corona	1x10 ¹³	1x10 ¹³	Δ	Δ
Ex. 4	20/60/20	uniaxial	8	Corona	4x10 ¹¹	3x10 ¹¹	⊙	⊙

5. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

July 12, 2002
Date

Masaaki Yamamoto
Masaaki Yamamoto